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## INSECT DAMAGE TO MINE PROPS AND METHODS OF PREVENTING THE INJURY.

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## INTRODUCTION.

Wood-boring insects are one of the principal causes of the deterioration and destruction of timbers used in mines. The injury is effected both before and in some cases after placement in the mine.

This circular is based on special investigations in cooperation with mining companies. It is intended to give preliminary information on the principal types of insect injury and to show how a large percentage of injury can be prevented.

In recent publications<sup>1</sup> of this bureau general information is given on methods for the prevention of injury by insects to forest products, including mine props. Several of these methods have been adapted to the need of preventing injury to this special class of product, and are included in the present circular.

## INJURY TO UNBARKED, ROUND, AND SPLIT PROPS BEFORE PLACEMENT IN THE MINE.

Both soft and hardwood timber, which has been felled for mine props, and unbarked props that have been cut and left lying stacked in the woods or in the yard at the entrance to the mine, are liable to infestation with the grubs or larvae of wood-boring insects. These grubs, which hatch from eggs deposited by winged insects attracted by the odor of the fresh-cut timber, continue to work in the props

<sup>1</sup> Insect Depredations in North American Forests. (Bul. 58, Part V, Bur. Ent., U. S. Dept. Agr., 1909.) Insect Injuries to Forest Products. (Cir. 128, Bur. Ent., U. S. Dept. Agr., 1910.)

after they have been transported from the woods and placed in the mine. The grubs of most injurious wood-boring insects can not become established in the timber unless the bark is on, because the bark serves as a protective covering under which the eggs can be deposited and affords proper moisture conditions for the development of the young grubs, many of which feed on the inner bark before entering the wood. The principal injuries to mine props by wood-boring insects are those caused by roundheaded and flatheaded borers, timber worms, and ambrosia beetles.

Injury to timbers by roundheaded and flatheaded borers and timber worms consists in burrows in the wood made by grubs, which hatch from eggs laid under the bark by winged beetles. These burrows, often of large size, not only decrease the length of service of the timbers, but also their structural strength. Running both transversely and longitudinally through the wood, these holes, even if the insects have discontinued their work, afford entrance to moisture and wood-destroying fungi; the decay is thus enabled more rapidly and completely to penetrate the heartwood.

Injury by ambrosia beetles consists of pinhole and bluing defects in the wood. The pinhole defects also contribute to more rapid decay.

There is, therefore, a complicated interrelation between these wood-boring insects and wood-destroying fungi in the deterioration of mine timbers.

#### INJURY TO PROPS AFTER PLACEMENT IN THE MINE.

In the Southern States the principal injury to props and other timbers in slope or incline mines is caused by small, white, soft-bodied insects known as "wood lice," white ants, or termites. These destructive insects work in moist or decaying wood. Timbers placed on the heavily timbered slope or incline, extending from 250 to 300 feet from the exterior into the mine, are attacked by termites, as are those used in "headings" near the surface of the ground. Individuals of the winged form enter the mine and establish colonies at the base of the props. The moist condition of the prop at the base, where the wood is in contact with the ground and where there is usually incipient decay, offers especially favorable conditions for injury by this class of insects.

The presence of these insects is not easily detected. Their work is hidden beneath an outer shell of wood, often very thin, but always left intact; therefore an ordinary inspection of the exterior of the props will not reveal the presence of the insects or their destructive work. The entire interior may be completely honeycombed while there is nothing on the exterior to indicate the injury. Sometimes an earthy matter—partially digested wood mixed with earth—is em-

ployed to cover over such parts of their work as would otherwise be exposed to the light, which they carefully avoid.

It is well known that when once these insects have gained an entrance to the outer moist or decayed layers of wood they can continue their destructive work into the sound heartwood; on this account it is very important to prevent them from becoming established.

**PREVENTION OF THE INJURY TO UNBARKED, ROUND, AND SPLIT PROPS BEFORE PLACEMENT IN THE MINE.**

By simply adapting methods of handling the timbers, before placement, to well-known facts in the life history of the insects a large percentage of injury can be prevented. If a sufficient quantity of props be cut far enough ahead of the time when needed, and stored either in the yard at the mine or in a general storage yard most accessible to the largest number of mines, they can be properly handled to prevent insect injury and a reserve supply established. The logs should be barked in the woods within a few days after felling the trees. After cutting into props they should be transported to the place of storage and piled in loose stacks in such a manner as to facilitate rapid drying, guarding against excessive checking. After a reserve supply has been established it will no longer be necessary to cut mine timber during the warmer months when the insects which deposit eggs in the bark or wood are flying. The periods during which these insects are flying vary with the locality and the species of insect, but, in general, in the region north of the Gulf States the period of activity is from April to the middle of October. In all cases where timbers are to be left stacked, either in the woods or yard, the bark must be removed before the end of March to avoid attack by insects.

By barking and seasoning mine timbers, insect injury before placement will not only be prevented, but injury by termites after placement will also be delayed or under some conditions even prevented and the length of life of the timbers prolonged.

Therefore the timber should always be barked except in rare instances where it is to be used in workings of a very temporary character. If unbarked round or split props are to be used in temporary workings where it would not be practicable to remove the bark, the trees should be cut during the fall and early winter. As soon as possible after cutting, props should be stacked in "open-crib" piles in a place where they will dry most rapidly, without excessive checking, preferably after they have been transported from the woods, because if the inner bark is dried out before the insects begin to fly in the spring the more destructive insects will not attack them. Split props should be piled with the bark side up so that the inner bark will dry. Logs or props should not be left lying on the ground. Un-

barked props, especially props cut from insect-killed, fire-killed, or other dead standing timber, should be thoroughly inspected before they are placed in the mine and all props showing serious damage by insects discarded. The presence of wood-boring insects can be detected by sawdust-like boring dust that is expelled from their burrows and lodges in crevices in the bark.

#### PREVENTION OF INJURY TO TIMBERS BY TERMITES AFTER PLACEMENT.

As previously stated, the seasoning that prevents injury before placement will delay and under some conditions even prevent injury to mine timbers by termites after placement, since moisture or incipient decay is necessary for destructive work. In consequence, seasoning is recommended where it is impracticable to treat timbers with chemical preservatives.

Methods of superficially treating props by brushing the exterior with various chemical preservatives will be temporarily effective in keeping out termites, if the work is thoroughly done and both ends are also treated. Where the basal area is left untreated, termites will enter the prop through the untreated portion. It will readily be seen that neither brushing nor spraying the exterior of the prop after placement in the mine, as is sometimes practiced, is effective in keeping out termites, since the end that sets in the ground could not be treated, and it is usually here that termites attack the props.

Before treating timber with chemical preservatives, especially where the brush method is used, it is essential that the timber be thoroughly seasoned, otherwise penetration will be retarded.

Impregnating props intended for permanent service with creosote by some standard process (either by the "open-tank" or by the cylinder-pressure processes) will keep out termites and other wood-boring insects and preserve the props for a much longer period than they would last untreated.

Publications of the Forest Service should be consulted for information on general methods of treating timbers with preservatives and the relative efficiency of various methods and chemicals.<sup>1</sup>

Approved:

JAMES WILSON,

*Secretary of Agriculture.*

WASHINGTON, D. C., April 10, 1912.

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<sup>1</sup> See especially Bulletin 107 of the Forest Service, U. S. Department of Agriculture, "The Preservation of Mine Timbers."

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